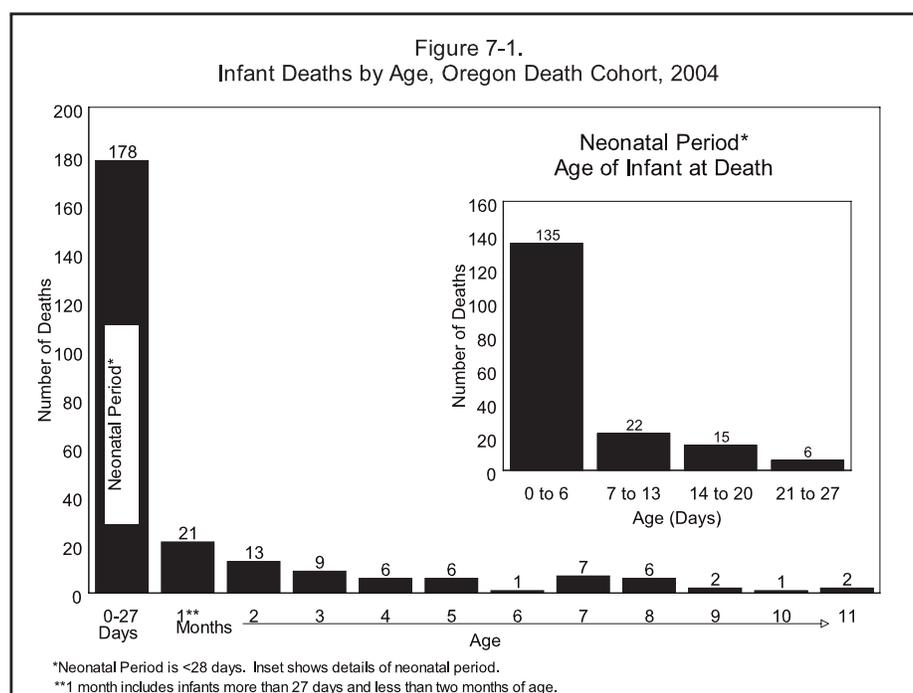


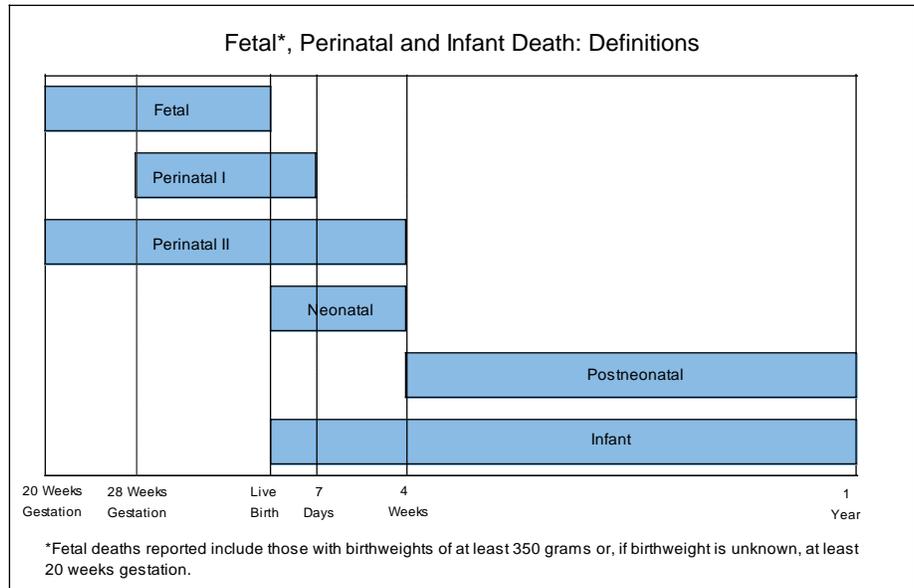
Fetal and Infant Mortality

INTRODUCTION

This report presents fetal and infant mortality data. Infant deaths are deaths that occur within one year of birth. Fetal deaths included in this report are of fetuses whose birth weight was at least 350 grams or, if birth weight was unknown, 20 weeks gestation or more. This definition applies to data after 1998. Although fetal and infant deaths are useful in statistically describing deaths within a given time frame, their fundamental purpose is to assist in discovering and evaluating preventive strategies to improve infant health. As an aid to understanding and monitoring health trends, this report divides fetal and infant deaths into five categories, which overlap and are not necessarily mutually exclusive: (1) fetal deaths, (2) perinatal deaths, (3) infant deaths, (4) neonatal deaths and (5) postneonatal deaths, as defined by the National Center for Health Statistics (see diagram, next page).

This report analyzes the above categories using three databases: (1) fetal deaths, (2) infant deaths and (3) births. National publications covering the subject may use one or any combination of these databases. As a result, death rates often vary slightly depending on which cohort was used as the source of the statistical data. Throughout this report, some tables display rates and ratios based on small numbers of events. Rates and ratios based on fewer than five events are unreliable; therefore, use great caution in inferring causal relationships based solely on the data contained in these tables.





DEFINITIONS AND METHODOLOGY

Before analyzing fetal and infant death data, it is necessary to define their different components.

- **Fetal deaths** are those that occur to fetuses whose birth weight is at least 350 grams or, if birth weight was unknown, after 20 weeks gestation, in which the developing fetus dies either in utero or upon delivery. They are classified as “early” (20-27 weeks gestation) or “late” (28 weeks gestation or more), and Oregon public health and safety laws require that they be reported.¹

- **Infant deaths** are those that occur during a child’s first year (i.e., measured from birth through 364 days). Infant deaths include both neonatal and postneonatal deaths.

Neonatal deaths occur during the first 27 days of life. Neonatal deaths may be “early” (under 7 days) or “late” (7-27 days).

Postneonatal deaths occur from day 28 through day 364 after birth.

- **Perinatal deaths-definition I** includes fetal deaths at 28 weeks gestation or more, and infant deaths of less than 7 days.
- **Perinatal deaths-definition II** includes fetal deaths at 20 weeks gestation, or more and infant deaths of less than 28 days.
- The **death cohort** for infant death includes all infant deaths that occurred in any given calendar year, regardless of birth year. In this report, the death cohort consists of those infants who died in 2004.
- The **birth cohort** for matched infant death includes all infants born in the same calendar year who die within one year of their birth. In this report, the birth cohort consists of those infants who were born in 2003, and died in either 2003 or 2004.

USE OF THE 2004 DEATH COHORT

This report uses data from the 2004 death cohort as the basis for analyzing infant deaths without maternal or birth characteristics, a standard demographic and health-status monitoring technique that yields the most timely and current information. Consistent longitudinal or historical data can be found more easily at national and local levels with a death cohort because its use does not involve matching corresponding birth records.

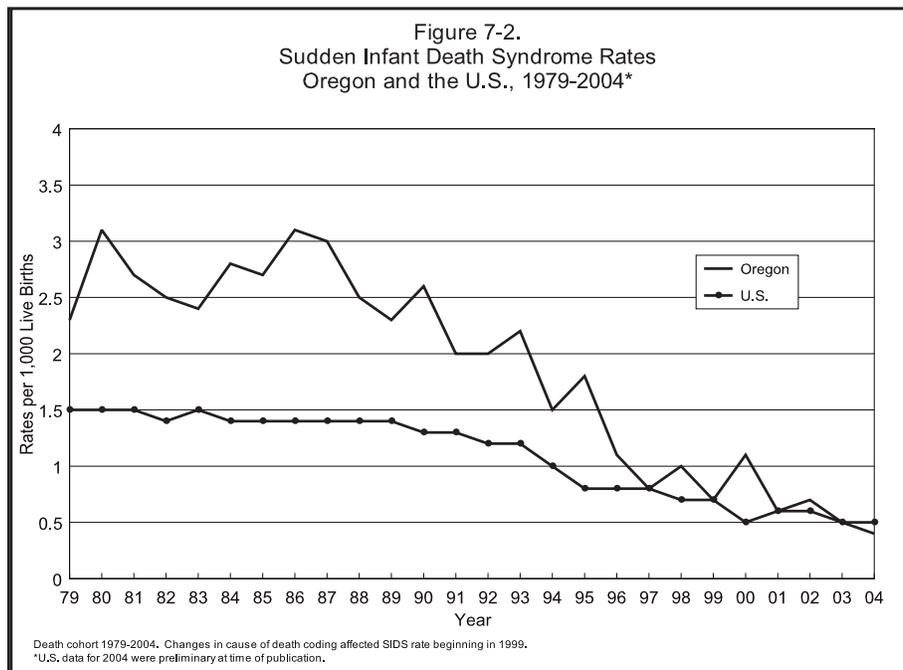
Infant characteristics at the time of death are derived from death certificates. The characteristics of most interest are age at death, county of residence at death and underlying cause of death. Total age-specific and cause-specific mortality ratios are computed by dividing the number of infant deaths in a calendar year by the number of births in the same calendar year.

INFANT DEATH: BASIC FACTS

Here are the basic statistics on infant deaths in Oregon during 2004:

- 252 infants under age one died.
- The infant death rate was 5.5 deaths per 1,000 births, a decrease of 1.8 percent from the previous year. The decrease was not statistically significant.
- Oregon’s 2004 infant death rate is nearly 19 percent lower than the preliminary 2004 U.S. rate of 6.8 per 1,000 births.² [Table 5-1].
- As in previous years, most infants who died during 2004 were less than 28 days old. [Figure 7-1]. More than three out of four (75.8%) of these neonatal deaths occurred within the first week of life.

***During 2004,
252 infants under age
one died.***



**There were
19 SIDS deaths
in 2004.**

Sudden Infant Death Syndrome

Sudden Infant Death Syndrome (SIDS) is the sudden and unexpected death of an apparently healthy infant under one year of age usually during the postneonatal period. Historically, Oregon’s SIDS rate has been higher than the national rate and SIDS has been a leading cause of death among Oregon infants. [Figure 7-2].

The number of SIDS deaths decreased slightly from 23 deaths in 2003 to 19 in 2004. In 2004, SIDS accounted for 7.5 percent of the state’s total infant deaths and 24.3 percent of all postneonatal deaths. The 2004 Oregon SIDS death rate was 0.4 deaths per 1,000 live births, a slight decrease from the 2003 rate of 0.5. [Figure 7-2].

The 2004 rate of SIDS deaths in Oregon was nearly the same as the preliminary 2004 U.S. rate (0.5 per 1,000 live births). [Figure 7-2]. Nationally, SIDS was responsible for 2,109 deaths in 2004 making it the third leading cause of infant mortality.²

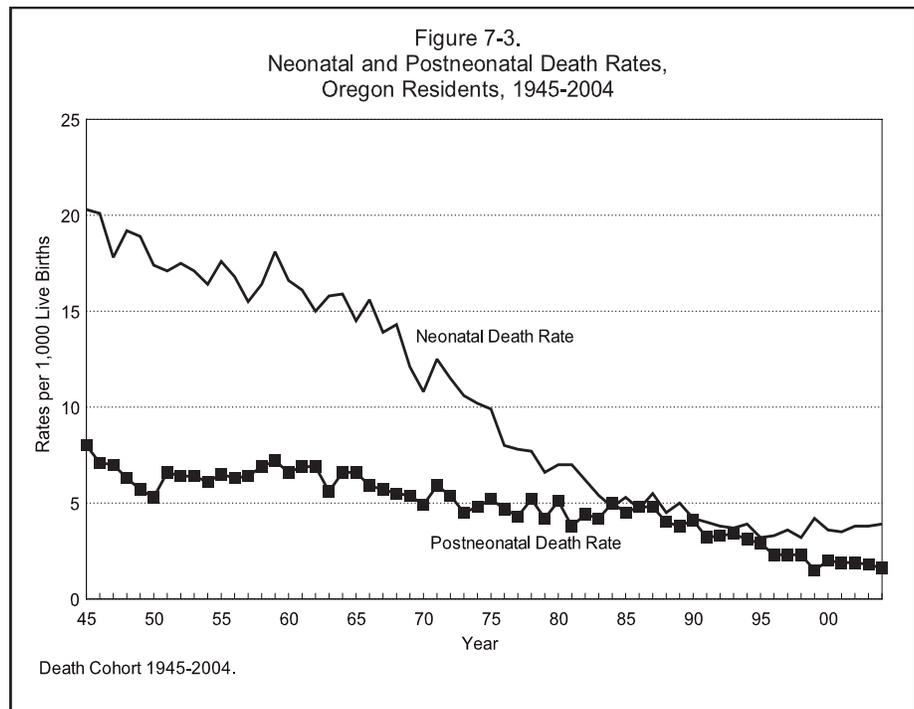
Neonatal Deaths Due to Respiratory Distress Syndrome			
YEAR	NUMBER	PERCENT*	RATE**
1989	32	15.6	77.6
1990	12	6.7	28.0
1991	9	5.2	21.2
1992	7	4.1	16.7
1993	7	4.5	16.8
1994	10	6.1	23.9
1995	4	2.9	9.4
1996	5	3.4	11.5
1997	2	1.3	4.6
1998	8	5.6	17.7
1999	7	3.1	13.3
2000	6	3.6	13.1
2001	5	3.2	11.0
2002	4	2.3	8.9
2003	3	1.7	6.5
2004	6	3.4	13.1

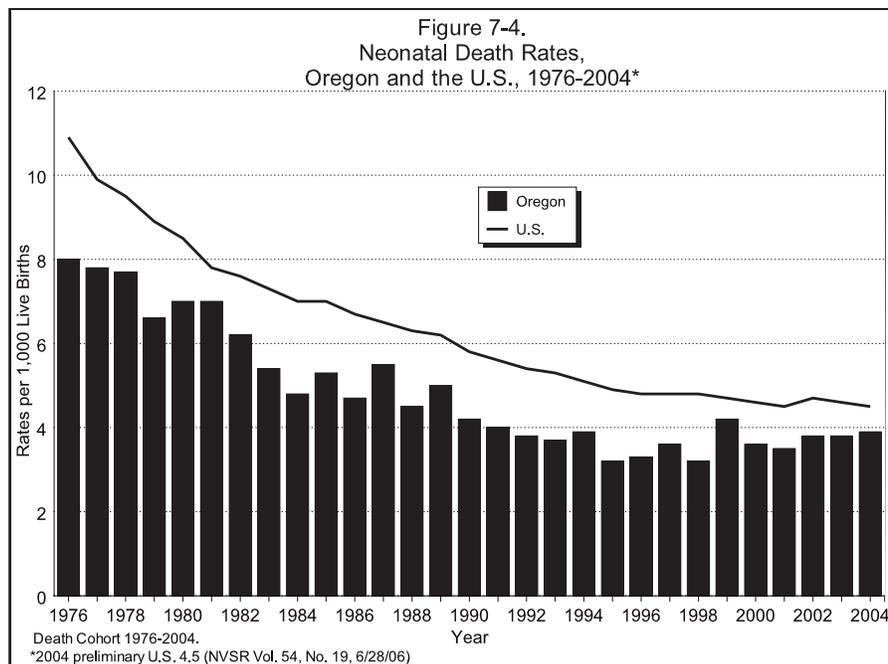
- Quantity is zero.
* Percent of neonatal deaths due to RDS.
**Per 100,000 live births.

NEONATAL DEATH

Neonatal and postneonatal death rates have been declining since 1945, when the neonatal death rate was 20.0 per 1,000 births and the postneonatal death rate was 8.0 per 1,000 births. In 2004, the neonatal death rate was 3.9 per 1,000 births and the postneonatal death rate was 1.6 per 1,000 births. [Figure 7-3, Table 7-1].

In 2004, 178 infants died during the neonatal period, nearly the same number as in 2003, 173 deaths. Oregon’s neonatal death rate has consistently been below that of the U.S. [Figure 7-4] (last available data, preliminary 2004). The 2004 rate is 13.3 percent





lower than the 2004 national rate of 4.5. [Tables 5-1 and 5-2]. As in previous years, congenital anomalies were responsible for more neonatal deaths (30.3%) than any other cause, followed closely by short gestation and fetal growth (24.2%), and maternal factors (18.5%). [Table 7-2]. In the last decade the number of neo-natal deaths due to Respiratory Distress Syndrome (RDS) decreased from 32 in 1989 to 6 in 2004 [see sidebar, previous page].

POSTNEONATAL DEATH

In 2004, 74 infants died during the postneonatal period, representing 29.4 percent of all infant deaths. The postneonatal death rate (1.6 per 1,000 live births) is an 11.1 percent decrease from 2003 (1.8 per 1,000). [Figure 7-3]. External causes, including accidents and assaults were the most frequent cause of death with more than one-third of postneonatal deaths (26). SIDS was the second most frequent cause of death and accounted for 24.3 percent of postneonatal deaths. [Table 7-2]. Historically, Oregon's postneonatal death rate has been higher than the U.S. rate; however, in 2004 for the sixth consecutive year the state rate was lower than that of the preliminary national postneonatal rate (2.3 per 1,000 live births in 2004).

FETAL DEATH

In 2004, there were 184 Oregon resident fetal deaths, exactly the same number of fetal deaths as in the preceding year. Fetal deaths were first reported to the Health Division in 1928, when the ratio was 29.0 for every 1,000 live births. Since then the ratio has followed a general downward trend, and has remained under 6.0 since 1992. [Figure 7-5].

Cause of Death

Causes of Oregon’s 184 fetal deaths in 2004 are shown in Table 7-4. The most frequently reported cause of fetal death in 2004 (74 deaths) was “fetal death of unspecified cause.” “Complications of the placenta, cord and membranes” was the second highest cause of death (52 deaths). Congenital anomalies was third with 19 deaths. These three causes of death represented 75 percent of all 2004 Oregon fetal deaths. "Fetal death of unspecified cause" has increased from 39 (18.4% in 1999, the first year Oregon used ICD-10 codes) to 74 (40.2%) in 2004. Frequencies of other causes were not too dissimilar from previous years.

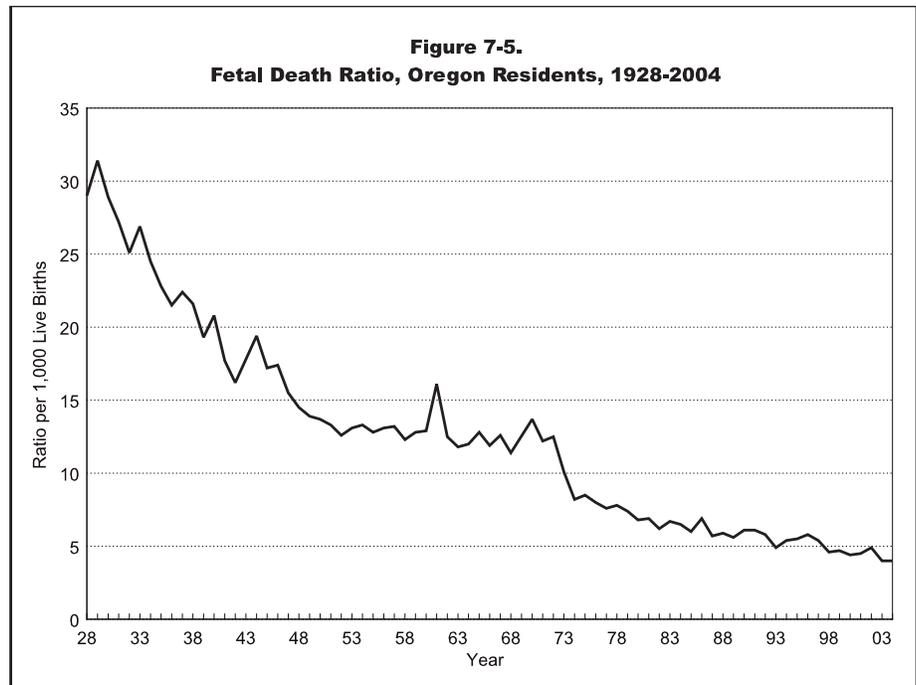
USE OF THE 2003 BIRTH COHORT

Methodology

Infant and perinatal death statistics can also be determined by use of a birth cohort, with all rates and ratios based on the number of births and fetal deaths that occurred in 2003. Because birth cohorts contain infants who die within their first year of life, some die during the following calendar year, thus requiring the inclusion of 2004 death data in the report on the 2003 birth cohort. For illustration, of the 236 deaths to infants born in 1998, 206 died in calendar year 1998 and 30 died in the calendar year 1999; only the 30 infants who died during 1999 are represented in the 1999 death cohort.

The Center for Health Statistics has produced tables containing infant and perinatal death data from the birth, fetal death, and matched infant death files. These birth cohort tables display

Fetal Death Ratios Per 1,000 Live Births By Mother's Age					
AGE	YEAR				
	2004	2003	2002	2001	2000
Total	4.0	4.0	4.9	4.5	4.4
15-44	4.0	4.0	4.9	4.5	4.3
15-19	4.8	4.1	4.5	5.0	5.1
20-24	4.1	4.0	5.3	3.9	3.8
25-29	2.9	3.8	3.2	4.0	4.2
30-34	4.0	3.1	5.5	4.3	4.1
35-39	5.0	5.2	6.4	6.1	5.4
40-44	8.2	7.5	7.7	10.9	6.0



data for infant and perinatal deaths according to several maternal risk factors and low birthweight. Additionally, this report presents neonatal and postneonatal deaths that were matched to their corresponding birth. Thus, a birth occurring at the end of December 2003 may have a matched postneonatal death that occurred up to one year later, at the end of December 2004.

Use of a birth cohort from a matched birth and death file allows analysis of characteristics of an infant's mother during pregnancy and delivery. The characteristics of interest are mother's marital status, age, ethnicity, race, education, start of prenatal care, tobacco use, and alcohol use. The characteristics of the infant that are derived from the birth certificate and fetal death certificate include birthweight, gestational age, and county of residence at time of birth.

Small Numbers

Because of the small numbers of events in some of the risk factor categories, this report uses three-year groupings of the risk characteristics to improve statistical reliability. Single-year tables displaying risk factors are also included for comparison with statistics of prior years, but the analysis of risk factors and maternal characteristics are done using only the three-year tables.

Perinatal Deaths

Perinatal deaths, reported in Tables 7-13 through 7-16, combine fetal deaths of specific gestation and neonatal deaths. (Please refer to Page 7-2 for definitions.) These tables present a more comprehensive picture of late gestation fetal deaths and neonatal deaths. As shown in Figure 7-6, there is a statistically significant negative correlation between fetal and neonatal deaths, although both have declined overall. While patterns among groups (race, ethnicity, age, and marital status) are similar to neonatal and postneonatal, researchers and educators may find a time period inclusive of the period shortly before and after birth useful. This information also allows comparisons with national and international data using the standard definitions.

NEONATAL DEATHS: 2001-2003 BIRTH COHORT

The mothers of infants who died during the neonatal period had various characteristics that may have affected the outcome of their pregnancies. These include marital status, age, ethnicity and race, education, prenatal care, tobacco use, and alcohol use. [Table 7-16].

Birthweight

The birthweight of an infant has long been a predictor of subsequent survival. An increase in birthweight is correlated with a decrease in the risk of neonatal death. For the period 2001-2003

***Birthweight
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predictor of
survival.***

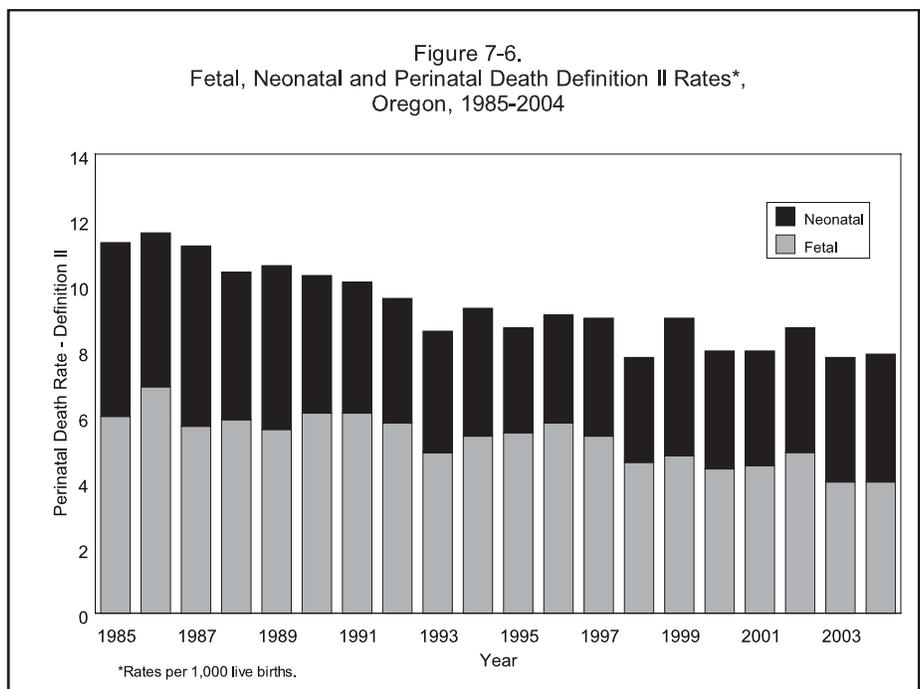
the neonatal death rate generally decreased by one-half or more for each subsequent 250 to 500-gram increase in weight for infants weighing less than 3000 grams at birth. [Table 7-12]. Nearly all the infants weighing less than 500 grams died. The death rate for infants weighing less than 500 grams was 939.6 per 1,000 live births, decreasing to 1.0 per 1,000 live births for infants weighing more than 2,500 grams. [Figure 7-7].

Many of the same behavioral, social and medical conditions associated with higher rates of infant deaths are also associated with lower birthweights. Some conditions are highly associated with one another and have confounding or mitigating effects on each other. This report does not try to account for or hold all these variables constant in relation to each other. Instead, it presents a simple descriptive analysis.

Maternal Characteristics

Though most women reported being married at the time of birth, the neonatal death rate was statistically significantly higher for unmarried women (4.4 versus 3.3 per 1,000). [Table 7-18]. Both women with a high school diploma or GED (4.0 per 1,000) and women without a high school diploma or GED (4.1) had a statistically significantly higher neonatal death rate than women with some college (2.9). [Table 7-18]. The neonatal death rate for infants of African American mothers (4.7 per 1,000) and American Indian mothers (6.3) were higher than the neonatal death rate for infants of White Non-Hispanic mothers (3.7) and this difference was statistically significant. [Table 7-18].

Figure 7-6.
Fetal, Neonatal and Perinatal Death Definition II Rates*,
Oregon, 1985-2004



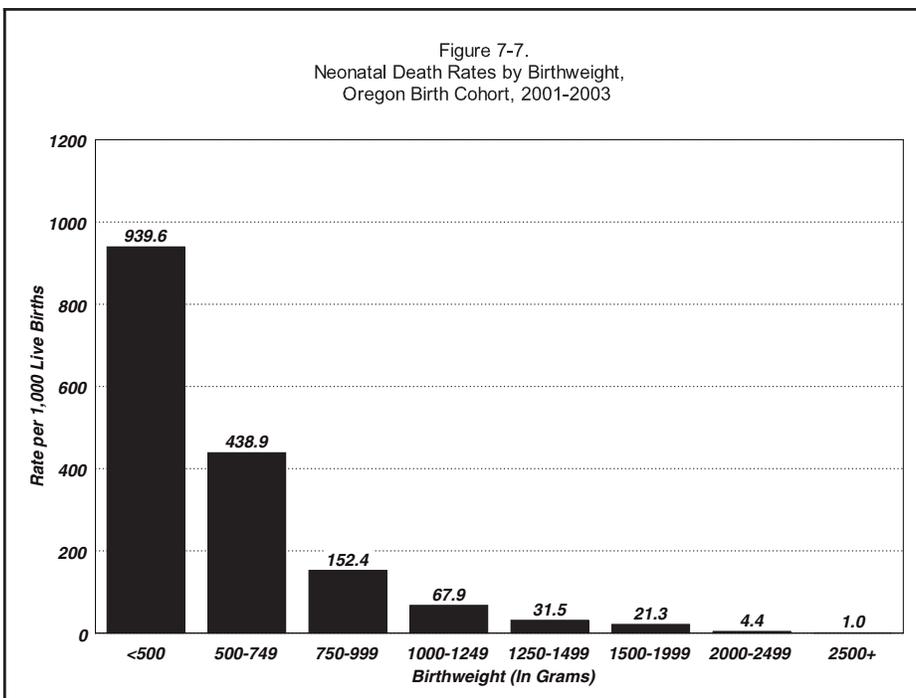
Prenatal Care

Women who received any prenatal care had a statistically significantly lower neonatal death rate than women who received no prenatal care (3.4 versus 22.7 per 1,000). Among women who received prenatal care, those who began care in the first or second trimester displayed higher death rates (3.5 per 1,000 births) than those receiving care beginning in the third trimester (2.3 per 1,000), probably due to the effect of increased gestational age. [Table 7-18].

Tobacco/Alcohol Use

Among women whose infants died during the neonatal period, 16.9 percent reported using tobacco during their pregnancy. The infants of these women had a higher neonatal death rate compared to those women who did not use tobacco (5.0 versus 3.3 per 1,000). Less than two percent (1.9%) of the mothers whose infants died during the neonatal period reported using alcohol during their pregnancy. There may be under-reporting of alcohol and tobacco use, thereby lowering the neonatal death rates for this category by eliminating high-risk people from the analysis.

Figure 7-7.
Neonatal Death Rates by Birthweight,
Oregon Birth Cohort, 2001-2003



POSTNEONATAL DEATHS: 2001-2003 BIRTH COHORT

Higher postneonatal death rates were found among the children of mothers who were unwed, without a high school diploma or GED, or used tobacco during pregnancy. These rates were statistically significant. Although the children of non-hispanic American Indians and non-hispanic African Americans had higher rates of postneonatal mortality, neither rate was statistically significant. [Table 7-18].

REFERENCES

- 1 Prior to November 10, 1998, fetal deaths occurring at 20 weeks of gestation or more were reported. Effective November 10, 1998, the Oregon Legislature amended ORS 432.333 to read, "Each fetal death of 350 grams or more, or, if weight is unknown, of 20 completed weeks gestation or more, calculated from the date last normal menstrual period began to the date of delivery, that occurs in this state shall be reported within 5 days after delivery to the county registrar of the county in which the fetal death occurred or to the Center for Health Statistics or as otherwise directed by the Center for Health Statistics."
- 2 Hoyert DL, Heron MP, Murphy SL, Kung HC. Deaths: Final data for 2003. National Vital Statistics Reports; Vol. 54, No. 13. Hyattsville, Maryland: National Center for Health Statistics. 2006.
- 3 Miniño AM, Heron M, Smith BL. Deaths: Preliminary data for 2004. Health E-Stats. Released April 19, 2006.